

# 2SC5658M3T5G, 2SC5658RM3T5G

## NPN Silicon General Purpose Amplifier Transistor

This NPN transistor is designed for general purpose amplifier applications. This device is housed in the SOT-723 package which is designed for low power surface mount applications, where board space is at a premium.

### Features

- Reduces Board Space
- High  $h_{FE}$ , 210–460 (typical)
- Low  $V_{CE(sat)}$ , < 0.5 V
- ESD Performance: Human Body Model; > 2000 V, Machine Model; > 200 V
- Available in 8 mm, 7-inch/3000 Unit Tape and Reel
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are Pb-Free Devices

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Rating	Symbol	Value	Unit
Collector-Base Voltage	$V_{(BR)CBO}$	50	Vdc
Collector-Emitter Voltage	$V_{(BR)CEO}$	50	Vdc
Emitter-Base Voltage	$V_{(BR)EBO}$	7.0	Vdc
Collector Current – Continuous	$I_C$	150	mAdc

### THERMAL CHARACTERISTICS

Rating	Symbol	Max	Unit
Power Dissipation (Note 1)	$P_D$	260	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 ~ +150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

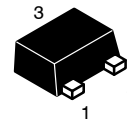
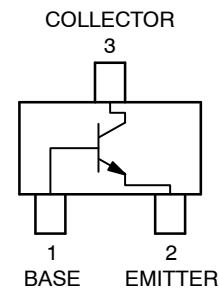
1. Device mounted on a FR-4 glass epoxy printed circuit board using the minimum recommended footprint.



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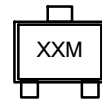
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## NPN GENERAL PURPOSE AMPLIFIER TRANSISTORS SURFACE MOUNT



SOT-723  
CASE 631AA

### MARKING DIAGRAM



XX = Specific Device Code  
(B9 = 2SC5658M3T5G  
RM = 2SC5658RM3T5G)  
M = Date Code

### ORDERING INFORMATION

Device	Package	Shipping†
2SC5658M3T5G	SOT-723 (Pb-Free)	8000 / Tape & Reel
2SC5658RM3T5G	SOT-723 (Pb-Free)	8000 / Tape & Reel
NSV2SC5658M3T5G	SOT-723 (Pb-Free)	8000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

Characteristic	Symbol	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage ( $I_C = 50 \mu\text{Adc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	50	–	–	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 1.0 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	50	–	–	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 50 \mu\text{Adc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	7.0	–	–	Vdc
Collector-Base Cutoff Current ( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	–	0.5	$\mu\text{A}$
Emitter-Base Cutoff Current ( $V_{EB} = 4.0 \text{ Vdc}$ , $I_B = 0$ )	$I_{EBO}$	–	–	0.5	$\mu\text{A}$
Collector-Emitter Saturation Voltage (Note 2) ( $I_C = 50 \text{ mAdc}$ , $I_B = 5.0 \text{ mAdc}$ )	$V_{CE(sat)}$	–	–	0.4	Vdc
DC Current Gain (Note 2) ( $V_{CE} = 6.0 \text{ Vdc}$ , $I_C = 1.0 \text{ mAdc}$ ) ( $V_{CE} = 6.0 \text{ Vdc}$ , $I_C = 1.0 \text{ mAdc}$ )	$h_{FE}$	120 215	– –	560 375	–
Transition Frequency ( $V_{CE} = 12 \text{ Vdc}$ , $I_C = 2.0 \text{ mAdc}$ , $f = 30 \text{ MHz}$ )	$f_T$	–	180	–	MHz
Output Capacitance ( $V_{CB} = 12 \text{ Vdc}$ , $I_C = 0 \text{ Adc}$ , $f = 1.0 \text{ MHz}$ )	$C_{OB}$	–	2.0	–	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

\*Include NSV-prefix devices where applicable.

2. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , D.C.  $\leq 2\%$ .

TYPICAL ELECTRICAL CHARACTERISTICS

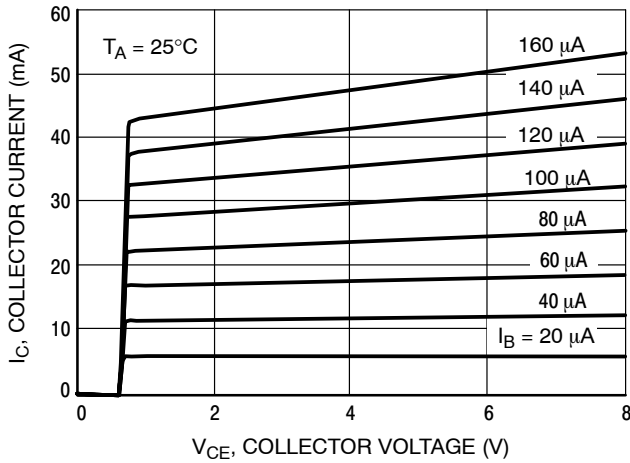


Figure 1.  $I_C - V_{CE}$

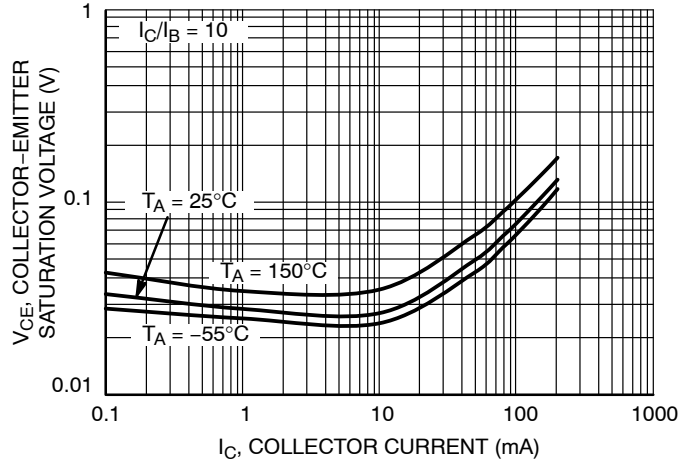


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

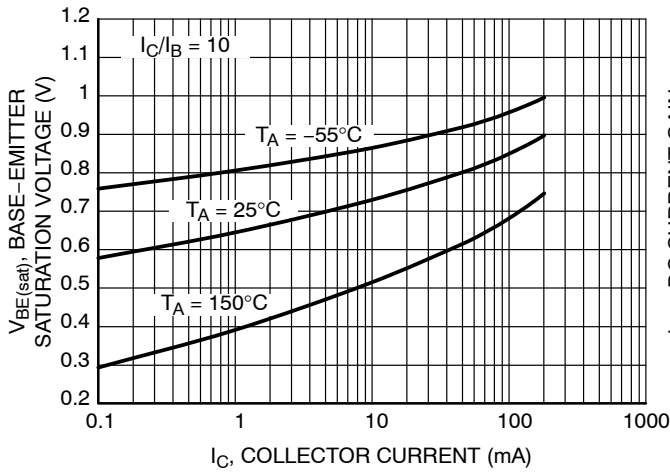


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

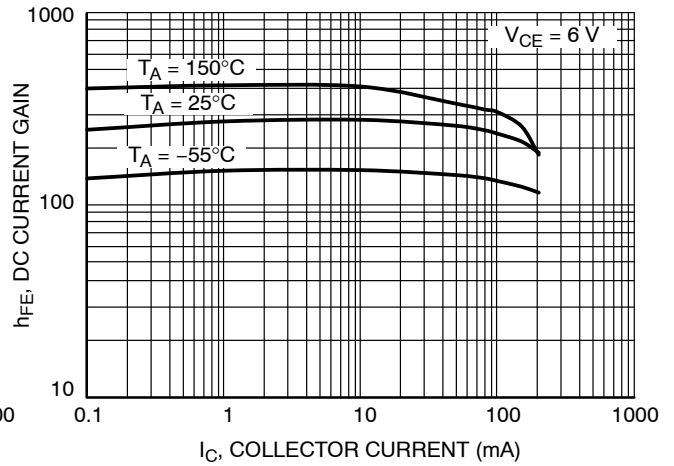


Figure 4. DC Current Gain vs. Collector Current

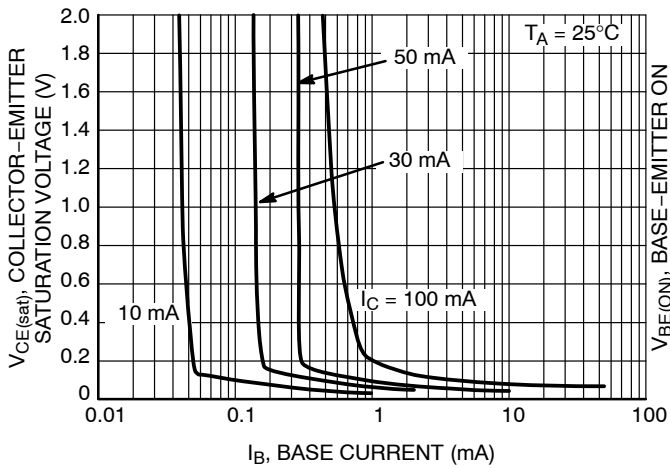


Figure 5. Saturation Region

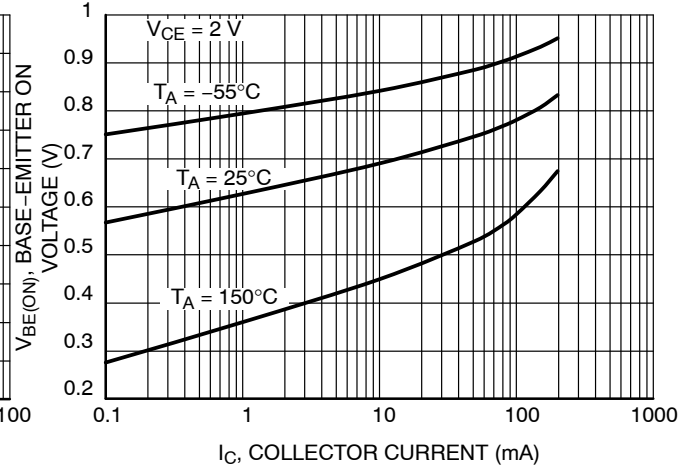


Figure 6. Base-Emitter Turn-ON Voltage vs. Collector Current

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## TYPICAL ELECTRICAL CHARACTERISTICS

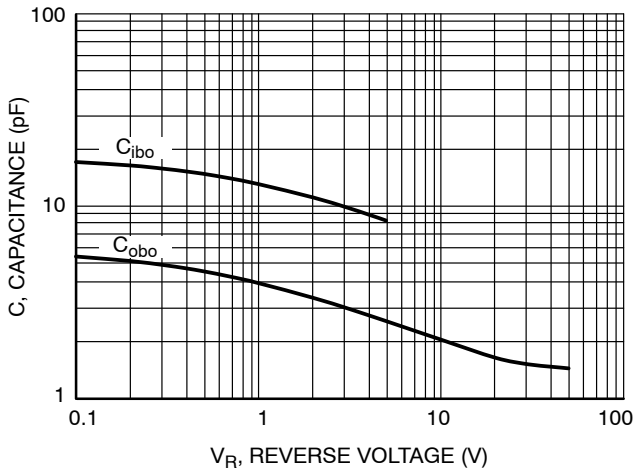


Figure 7. Capacitance

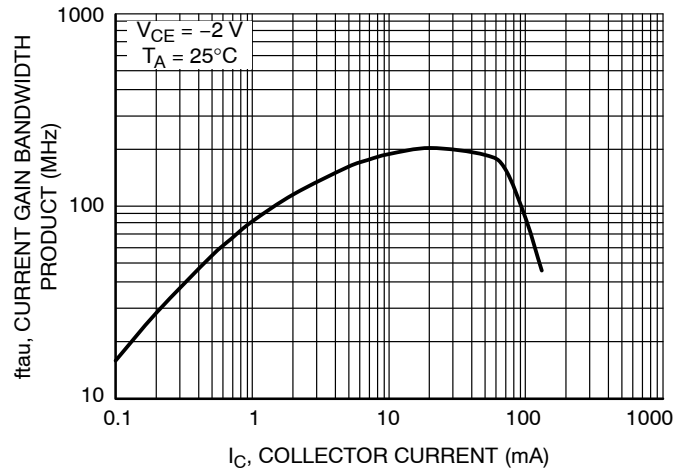


Figure 8. Current Gain Bandwidth Product vs. Collector Current

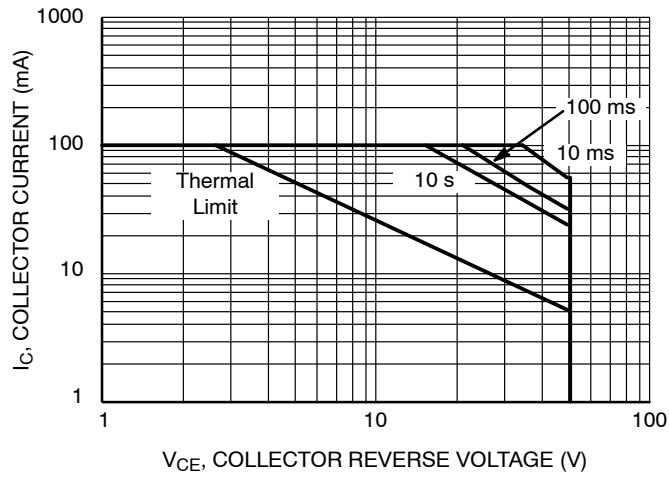


Figure 9. Safe Operating Area

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

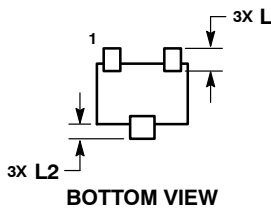
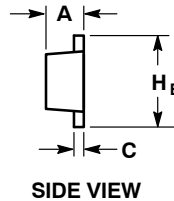
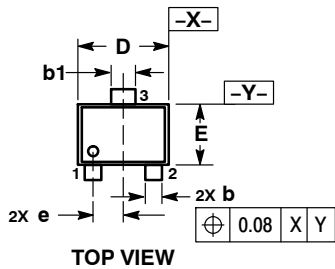
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SCALE 4:1

**SOT-723**  
CASE 631AA-01  
ISSUE D

DATE 10 AUG 2009

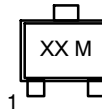


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.45	0.50	0.55
b	0.15	0.21	0.27
b1	0.25	0.31	0.37
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H E	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

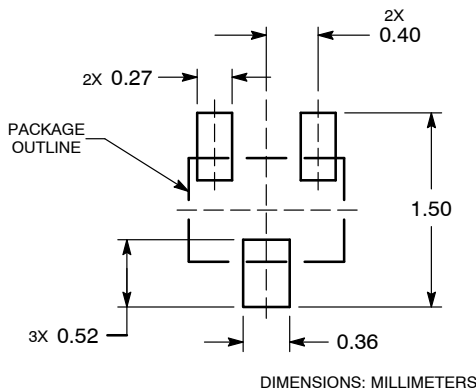
**GENERIC MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

- |                                                       |                                                  |                                                    |                                                      |                                                  |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|
| STYLE 1:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 2:<br>PIN 1. ANODE<br>2. N/C<br>3. CATHODE | STYLE 3:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE | STYLE 5:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|

**RECOMMENDED SOLDERING FOOTPRINT\***



\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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<b>DESCRIPTION:</b>	<b>SOT-723</b>	<b>PAGE 1 OF 1</b>

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